x (min)	y (psi)
0	36
5	24
10	16
15	10.7
20	7.1
25	4.7
30	0
35	0

a. Let $y = f(x)$. Find $f(5)$, $f(10)$, and $f(15)$.

b. Why is it reasonable to assume that f is an invertible function if x is in the domain $0 \le x \le 25$? Find $f^{-1}(24)$ and $f^{-1}(16)$, and give their real-world meanings.

c. Why is function f not invertible on the whole interval $0 \le x \le 35$? What do you suppose happens between 25 min and 30 min that causes f to not be invertible?

d. Plot the eight given points for function f and the eight corresponding points for the inverse relation. Connect each set of points with a smooth curve. Draw $y = x$ and explain how the two graphs are related to this line.

e. Suppose f is restricted to the domain $0 \le x \le 25$. What is the difference in the meaning of x as an input for function f and x as an input for function f^{-1}?

2. *Cricket Chirping Problem:* The rate at which crickets chirp is a function of the temperature of the air around them. Suppose that the following data have been measured for chirps, c, per minute, y, at temperatures in degrees Fahrenheit, x.

x (°F)	y (c/min)
20	0
30	0
40	5
50	30
60	55
70	80
80	105

a. Let $y = c(x)$. Find $c(40)$, $c(50)$, and $c(60)$.

b. For temperatures of 40°F and above, the chirping rate seems to be a one-to-one function of time. How does this fact imply that function c is invertible for $x \ge 40$? Find the values of $c^{-1}(30)$ and $c^{-1}(80)$. How do these values differ in meaning from $c(30)$ and $c(80)$?

c. Why is function c not invertible for x in the interval $20 \le x \le 80$? What is true in this real-world situation that makes c not invertible?

d. On graph paper, plot the seven given points for function c and the corresponding points for the inverse relation. Connect each set of points with a line or a smooth curve. Draw the line $y = x$ and explain how the two graphs are related to this line.

e. Suppose c is restricted to the domain $40 \le x \le 80$. What is the difference in the meaning of x as an input for function c and x as an input for function c^{-1}?

3. *Punted Football Problem:* Figure 1-5i shows the height of a punted football y, in meters, as a function of time x, in tenths of a second since it was punted. On a copy of the figure, sketch the graph of the inverse relation and show that the two graphs are reflections across the line $y = x$. How does the graph of the inverse relation reveal that the height function is not invertible?

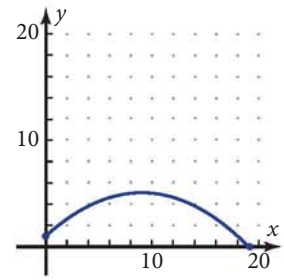

Figure 1-5i